

# Sustainability of Public Debt

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## **Sustainability of Public Debt: Introduction and Overview**

Reinhard Neck and Jan-Egbert Sturm

### **1.1 The Policy Problem**

The development of public debt and budget deficits has become a crucial policy problem in most industrialized countries.<sup>1</sup> Political debates about the future course of fiscal policy and the need to keep government debt under control abound, and the sustainability of public finances is one of the most widely discussed topics in economics these days. In recent decades, many countries have built up substantial amounts of public debt, often accompanied by growing public sectors and shortsighted fiscal policies. The need for a coordination of fiscal policies in the European Economic and Monetary Union (EMU), the understanding that today's overspending poses a threat for the well-being of future generations, the increasing pressure on fiscal policy in a globalized world, and future challenges to public finances owing to aging societies have brought about a lively and controversial discussion in both academia and the public.

### **1.2 The Concept of Sustainability**

Although sustainability of public finances has been discussed for more than a century now, it is still an imprecise concept. While it is intuitively clear that a sustainable policy must be such as to eventually prevent bankruptcy, there is no generally agreed upon definition of what precisely constitutes a sustainable debt position. The literature has proposed several methods to define and assess debt sustainability, differing in both time horizons and choice of variables. Debt sustainability can be regarded as a short-, medium-, or long-term concept, with the open question of how to define these horizons, and debt and deficits can be measured gross or net, including or excluding the liabilities of social security systems and other items.

### 1.3 Historical Development

Early contributions to the analysis of fiscal policy sustainability date back to classical authors like Hume, Smith, and Ricardo,<sup>2</sup> who discussed public debt mainly in terms of its general effects on the economy. The initial analysis focused on the comparison between tax and deficit financing of public expenditure, with the latter mostly assumed to be given exogenously. Government debt neutrality (i.e., the hypothesis that deficit and tax financing of government budgets are equivalent with respect to capital accumulation) and the intergenerational distribution of the debt burden were first discussed by Ricardo. He pointed out (but did not believe in) the possibility of public debt neutrality, which was later called the “Ricardian equivalence theorem,” revived and analytically derived by Barro (1974).

The issue of the generational distribution of the debt burden has also been discussed since the time of the classical economists. In the wake of the Keynesian approach, according to which markets are generally unable to ensure full employment of available resources, the “real resources view” argued that debt finance was necessary to ensure an adequate level of aggregate demand because intended savings cannot be fully absorbed by private investments. In addition, the Keynesians took up the position originally held by Ricardo that the burden of public debt is completely shouldered by the generation that issues the debt. The real resources view argues that this holds because current generations pay the opportunity cost of financing the debt, while debt service and repayment is only a transfer from taxpayers to bondholders, given that the debt is held within the respective country. In a nutshell, this view can be summarized by the phrase “we owe the public debt to ourselves.” Government budget deficits and hence rising government debt do not, therefore, pose particular problems: they are not harmful, and they are desirable in times of low aggregate demand and high unemployment to restore the full-employment equilibrium.

Other contributions focused on less excessive justifications of positive debt levels in the short and medium term. The theory of tax smoothing, which is due to Barro (1979) and derives from strict neo-classical premises, shows one mechanism by which public debt and deficits can be welfare improving. Barro’s model features a benevolent social planner who minimizes the welfare loss associated with distortionary taxation. In every period, the government needs to finance a given amount of spending, which is financed by a tax. The crucial find-

ing in Barro (1979) is that the social planner should keep the tax rate constant. The level of taxes is determined by the government's intertemporal budget constraint, which says that the present value of spending, which is exogenous in the model, has to be equal to the present value of taxes. Budget deficits and surpluses are used as a buffer when spending is temporarily high or low, or revenues are temporarily low or high, respectively. The tax smoothing policy is dominant in welfare terms, as the distortion caused by taxation increases more than proportionally in the tax rate. Hence, the distortion of a large tax rate in one single period is larger than the net present value of several small distortions caused by a tax smoothing policy.

Another rationale that justifies a positive level of public debt concerns intergenerational equity. Government spending today—in the form of public investment, or as spending on structural reforms that have upfront costs—can benefit future generations. If this spending today is financed by current revenues only, the generation living today is forced to bear all the costs but will not be able to reap the full benefits of public spending. However, if policies that deliver long-term economic benefits but require significant investment in the short run are financed by issuing debt, future generations will contribute to the cost. If the issuance of new debt is severely constrained, currently living voters will favor a suboptimally low level of public investment, as income is redistributed away from current generations to future generations in the case of full tax financing of public investment.

Hence the legitimacy of debt finance for public investment was increasingly recognized; the so-called golden rule that deficits be allowed up to the level of public investments even made it into the German constitution. Today, the exclusion of public investments from the calculation of deficit levels relevant for the EMU's Stability and Growth Pact is suggested by policymakers and economists.<sup>3</sup>

The discussion on public debt sustainability was revived in the 1980s, when public finances came into focus owing to a growing public sector and demographic trends leading to large liabilities of welfare systems. The literature was inspired by the discussion of sustainable resource use in environmental economics. Several characteristics of public debt suggest conceptual and methodological similarities to the analysis in resource economics.<sup>4</sup> First, public debt has some similarities to a renewable resource. Renewable resources, like fishing grounds, can be used up to a certain threshold. Beyond that point, the reproductive capacity of the resource is harmed; the resource becomes a nonrenewable

one and is finally used up. In much the same way, public debt, or its servicing, need not be a problem for an economy if it is low enough, but it can lead to default if overused. Second, deficits have the character of a pollutant. Pollutants can be released with no harm up to a certain level given by nature's absorptive capacity. Beyond that level, they may cause negative externalities for other individuals in the short run until the system eventually collapses in the long run. The parallel to public finances is straightforward here. Finally, the formal analysis of both environmental and fiscal policy sustainability involves the use of dynamic intertemporal or intergenerational models.

#### **1.4 Sustainability of Government Debt in the EMU**

In Europe, the discussion on sustainability became a public issue owing to the introduction of a common currency in the European Union. Politicians from countries with hard currencies, especially from Germany, feared that member states with lax fiscal policies could destabilize the common currency. Specifically, they feared that the European Central Bank (ECB) would have to bail out a fiscally troubled EMU member state. Following Eichengreen and Wyplosz 1998, when the government of an EMU country gets into fiscal trouble, investors might fear suspension or modification of debt service and start to sell their bonds. The prices of the bonds consequently fall. Banks, which generally hold large amounts of sovereign bonds, lose a lot of capital, possibly violating the minimum capital requirements, which causes a bank run. Bond markets in other countries are negatively affected too, as investors in EMU debt become demoralized. To prevent a collapse of the banking system, the EMU member states or the ECB would be forced to buy up the bonds of the government in distress. Alternatively, the ECB could be forced to inflate away the real value of the troubled country's debt. The cost of this bailout will eventually be borne by all EMU members. Such a bailout is formally forbidden by the Maastricht Treaty, but this is actually a time-inconsistent rule, since *ex post* a bailout might be the least costly response to a debt crisis.<sup>5</sup>

Another rationale for the introduction of a fiscal rule in the EMU was the fear that excessive spending in one or several member states could cause higher interest rates for the whole union owing to both large capital demand and imperfect financial markets, in the sense that higher risk premia are demanded not only from the members borrowing excessively but from all union members. Excessively high public

deficits and debt may be the outcome of the political process for many reasons.<sup>6</sup> This spending bias, which is already present in a single country, can be augmented in a monetary union if the deficits of individual countries give rise not only to higher spreads on their own bonds but also to a higher rate of interest in the whole union. Hence governments do not incur the full cost of additional spending, since the cost is borne by the union as a whole. As a consequence, higher financing costs lead to lower growth rates, inefficient intertemporal resource allocation, and financial instability.<sup>7</sup>

Additionally, not only the outright default of a member state can put a central bank under inflationary pressure. In their seminal paper, Sargent and Wallace (1981) argue that if monetary authorities can credibly commit to a low rate of money supply growth, fiscal authorities will anticipate that fiscal imbalances will not be offset by inflation. Hence, credible inflation targets can create a hard budget constraint, as governments will have to run primary surpluses to repay debt. The fiscal theory of the price level, developed by Woodford (1995) and Sims (1994), departs from the analysis of Sargent and Wallace in a crucial way. According to this theory, the intertemporal budget constraint will be respected even if the monetary or fiscal authorities do not actively follow policies to ensure compliance with the constraint. In the case that both monetary authorities stick to targeting low money supply growth and fiscal authorities keep running excessive deficits, market forces will induce the price level to adjust in the sense that government spending, through its effect on aggregate demand, induces changes in the price level and hence inflation. In a monetary union, this reasoning gains another dimension, as one single monetary authority has to deal with several fiscal policy authorities. Given that overspending in one or several member states leads to a heterogeneous inflation pattern across the union, the determination of an adequate monetary policy will be highly complicated. This holds not only for the EMU but also for other federal countries like the United States or Switzerland.

## 1.5 Conditions for Sustainable Public Finances

The starting point in the formal discussion of the requirements for debt sustainability is the government's budget constraint, which requires that current spending on goods and services plus the cost of servicing current debt equals current tax revenues plus the issuance of new

debt. This can be illustrated as follows. Assume that government borrowing takes the form of one-period bonds that pay an interest rate  $i_t > 0$  in period  $t$ . Government spending for goods and services in period  $t$  is denoted by  $G_t$ ,  $T_t$  denotes tax revenues in period  $t$ , and  $B_t$  denotes government debt issued in period  $t$ . Then the government's budget constraint in period  $t$  is<sup>8</sup>

$$G_t + (1 + i_t)B_{t-1} = T_t + B_t. \quad (1.1)$$

Let  $g_t$ ,  $\tau_t$  and  $b_t$  be the ratios of government spending for goods and services, tax revenues, and debt issuance to GDP in period  $t$ , respectively. Debt issuance in period  $t$  equals total debt at the end of period  $t$ , as government debt is assumed to be issued as one-period bonds. Then, equation (1.1) can be rewritten as

$$d_t + \frac{1 + i_t}{1 + \hat{y}_t} b_{t-1} = b_t, \quad (1.2)$$

where  $d_t = g_t - \tau_t$  is the primary budget deficit ratio and  $\hat{y}_t$  is the growth rate of GDP. Equation (1.2) implies that the debt ratio increases if the government runs a deficit and, at the same time, the nominal interest rate exceeds nominal GDP growth.

Governments cannot run Ponzi games in the long run; namely, governments cannot run a policy that uses the issuance of ever increasing new debt to repay old debt and to finance interest payments. Hence, the present discounted value of government debt, calculated over all future periods, must equal zero. Together with the No Ponzi Condition, equation (1.2) gives the government's intertemporal budget constraint

$$\sum_{t=1}^{\infty} \left( d_t \prod_{s=1}^t \frac{1 + \hat{y}_s}{1 + i_s} \right) + b_0 = 0, \quad (1.3)$$

where  $b_0$  is the current debt ratio. For fiscal policy to be sustainable, sustainability being defined as the absence of default risk, this condition must be met. Equation (1.3) says that the present discounted value of primary deficits plus the value of current debt must be zero. This also implies that running substantial deficits over a long time is consistent with sustainability as long as these deficits can be compensated for by sufficiently high future surpluses.

A second interpretation of sustainable fiscal policy considers the evolution of debt in the medium term. Here, sustainability is inter-



puted as a given reduction of the debt-to-GDP ratio over a given time horizon toward a target ratio.<sup>9</sup> This interpretation of debt sustainability is mainly justified by the view that governments with high debt levels are less flexible to respond to adverse shocks, as high debt servicing costs leave little room for fiscal policy intervention.

Consider the budget constraint of the government, formalized in the following way:

$$\Delta b_{t+1} \equiv b_{t+1} - b_t = (r - \hat{n})b_t + d_{t+1}, \quad (1.4)$$

where  $r$  denotes the real interest rate and  $\hat{n}$  the real GDP growth rate. Thus, in order to reduce the public debt ratio, the primary surplus must be larger than debt servicing, which can be expressed as

$$-d_{t+1} \geq (r - \hat{n})b_t. \quad (1.5)$$

Equation (1.5) says that that the debt ratio will increase indefinitely if the real interest rate exceeds real GDP growth unless the primary budget is in sufficient surplus. In this approach, the interest rate and the GDP growth rate are taken as exogenous.

Making the evaluation of fiscal policy sustainability dependent on the preceding conditions might be of little practical use. Bohn (1995) shows that policies that are sustainable in a certain world may no longer be so in case of uncertainty. Hence, while ex post evaluation of fiscal sustainability is rather straightforward, ex ante evaluation of current or planned fiscal policies is not trivial. The literature has thus proposed a large number of methods and indicators for the evaluation of fiscal policy.<sup>10</sup> This volume extends the existing literature and applies its methods to actual fiscal policies.

In the econometric evaluation of fiscal policy, two approaches are often pursued. The first examines whether the time series of public debt is nonstationary—that is, whether the debt-to-GDP ratio is increasing in real terms and exceeds future discounted surpluses. If it is not found to do so, the country's fiscal policy is regarded as sustainable. This approach requires finding an appropriate discount rate for the future surpluses, however, which is somewhat difficult. For this, and for more general, reasons, Bohn (chapter 2) calls this concept "ad hoc sustainability." His own concept and the criterion he developed circumvent this problem by showing that a fiscal policy that embodies strong enough reactions of the primary surplus to an increase in public debt is sustainable. He gives a more precise definition of these two

concepts, together with a discussion of their relation and their application to a long series of U.S. data, in chapter 2.

## 1.6 New Results

The results reported in the contributions to this volume that give an ex post evaluation of fiscal policy for various countries (chapters 2, 3, 4, and 5) do, at least in part, depend upon the definition of sustainability therein. The interesting point in these chapters from a policymaker's point of view is hence not only that for most of the countries that are studied in this volume, fiscal policy turns out to be sustainable in the long run, but that all countries, except for perhaps Italy, did manage to bring their debt back onto a sustainable path after a period of unsustainable policy. These results provide a more optimistic picture than that of Afonso (2005), who found evidence for sustainable fiscal policies in most European countries only toward the end of the 1990s.

In Europe, the Stability and Growth Pact (SGP) and the fiscal criteria of the Maastricht Treaty for entering the EMU are considered major devices to prevent excessive debt increases. Buti, Eijffinger, and Franco (chapter 6) discuss the pros and cons of the Stability and Growth Pact and possible remedies for the latter. Against established criteria for an ideal fiscal rule, its design and compliance mechanisms show strengths and weaknesses. The latter tend to reflect trade-offs typical of supranational arrangements. In the end, only a higher degree of fiscal integration would remove the inflexibility inherent in recourse to predefined budgetary rules. In the judgment of the authors, no alternative solution put forward in the literature appears clearly superior. This does not mean that the original pact of 1997 could not be improved. The debate on the SGP has shown that any reform should aim to overcome the excessive uniformity of the rules, improving their transparency, correcting pro-cyclicality and strengthening enforcement. The reform of the pact agreed upon in 2005 moves in this direction but leaves out a number of issues, as pointed out by Buti, Eijffinger, and Franco.

As mentioned earlier, an answer to the question as to whether a particular country's fiscal development has been sustainable or will be so in the future may depend crucially upon whether public liabilities from the system of social security are included or not. While most

country studies in this volume concentrate on the central government budget, Andersen, Jensen and Pedersen (chapter 7) focus on social security issues, showing that existing welfare arrangements in Denmark suffer from a lack of fiscal sustainability. This assessment is fairly robust to a number of demographic changes, with the important exception of changes in life expectancy. They also question the appropriateness of the current long-term fiscal strategy of prefunding, both with respect to its implications for intergenerational distribution and for its lack of ability to cope with the inherent economic uncertainty.

Evidence that a return to sustainable public finances can be reached not only through measures of fiscal policy—namely, by raising taxes and/or lowering government spending—is presented in the contributions by Hughes Hallett (chapter 8) and Feld and Kirchgässner (chapter 9), who study the effects of changes or differences in the institutional setup on fiscal policy performance.<sup>11</sup> Hughes Hallett examines the interaction of fiscal and monetary policy in the United Kingdom and finds that fiscal policy performance has greatly improved since fiscal policy Stackelberg leads an independent monetary policy, where fiscal policy concentrates on long-term objectives and monetary policy takes care of short-term stabilization.

Feld and Kirchgässner study the effects of fiscal rules and direct democracy on fiscal policy in the Swiss cantons. Fiscal rules, they find, do have a dampening effect on public deficits. This finding is supported by Galli and Padovano's study (chapter 3) of Italian fiscal policy, which shows a clear effect of the Maastricht rules.<sup>12</sup> Furthermore, Feld and Kirchgässner show that direct democracy is negatively correlated with public debt while it does not have a significant effect on deficits. This is a rather interesting observation, because it identifies direct democracy as a mechanism that is flexible enough to allow for short-term deficits owing to exogenous economic developments or large-scale one-off investment projects, but that ensures the sustainability of fiscal policy in the long run.

From the policymakers' view, however, the question as to whether past fiscal policy has been sustainable is only one point of interest. The question policymakers have to ask themselves is the following: given past fiscal policies, that is, given the current amount of public debt, is current fiscal policy and are future fiscal policies sustainable? That an unsustainable state of fiscal policy can be successfully changed is shown in the examples of the Netherlands (chapter 4) and possibly

(though the evidence is mixed) of Austria (chapter 5). The crucial point is, however, the evaluation of fiscal policies. As noted previously, this evaluation hinges on both the definition of sustainability and, at least within the concept of ad hoc sustainability, the choice of a correct discount factor. While the main determinants of this discount factor, the growth rate, the rate of inflation, and the real interest rate, can be forecast for some periods, in the long run apparently nearly anything can be assumed about these determinants. In addition, if public spending not only has consumptive character but is used at least in part to finance investments that benefit future generations, finding a proper discount rate to evaluate the sustainability of fiscal policy becomes even more difficult. First, the policymaker would have to compute the net present value of the investment projects. Second, to find the optimal level of investment, the policymaker would have to find a way to measure the aggregate level of intergenerational altruism, which may be rather challenging if not impossible.

Nevertheless, good reasons exist for examining the sustainability of public finances. First, at least Bohn's method of checking for sustainability is fairly easy to apply, thus providing a strong tool for a first assessment of the long-run implications of current fiscal policies. Moreover, and most important, several chapters in this volume show that the time horizon is crucial for determining whether fiscal policies are sustainable or not. The entire concept of public debt sustainability shifts policymakers' and citizens' attention toward the long run, which, owing to political constraints and to the (probably "pseudo") Keynesian legacy, often tends to be neglected in the actual political process. Although it is true that in a world of fully informed rational agents with perfect foresight, there will never be unsustainable government debt development because nobody will lend money to a government that is going to repudiate, in the actual economic environment of imperfect information and other market failures and, not the least, government failures, this is no longer true. If, in such a situation, economic analysis manages to demonstrate that certain fiscal policies violate the sustainability criterion, this can serve well to bring back such a government to the virtuous path of sound public budgets. Thus, although it will be some time before economists can provide clear-cut and unambiguous policy advice on fiscal matters with respect to public debt sustainability, using the methods and analytical concepts presented in this volume may give the applied economist a tool for raising the public's

awareness of misguided policies and affixing an emergency sign to such policies. Perhaps this is more than the “dismal scientist” can usually hope for.

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## Notes

1. It is even more true for many developing countries, which are, however, not under consideration in this volume. See, e.g., Cuddington 1999.
2. See Balassone and Franco 2000 for a survey and Rowley, Shugart, and Tollison 2002 for a collection of readings.
3. E.g., Blanchard and Giavazzi (2004).
4. See, e.g., Chichilnisky 1996, Heal 1998, and Hellwig 2005 for a general characterization of the notion of sustainability and Harris et al. 2001, Pezzey and Toman 2002, and Toman and Pezzey 2006 for surveys of the literature referring to environmental economics.
5. See, e.g., Beetsma and Bovenberg 1999, 2003.
6. See, e.g., Alesina and Perotti 1995, Persson and Tabellini 2000, and Drazen 2000 for surveys.
7. See, e.g., Fatas and Mihov 2003 and Schuknecht 2005.
8. The presentation follows Balassone and Franco 2000.
9. Blanchard et al. 1990 and Wyplosz 2005.
10. See, e.g., Balassone and Franco 2000, Chalk and Hemming 2000, and Artis and Marcellino 2000.
11. The influence of political institutions on budgetary outcomes has been investigated previously, e.g., in Poterba and von Hagen 1999.

12. Other suggestions for reforming the Stability and Growth Pact toward a “Sustainability and Growth Pact” are proposed by Coeuré and Pisani-Ferry (2005).

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